



(12) **United States Patent**
Chan et al.

(10) **Patent No.:** **US 9,230,356 B2**
(45) **Date of Patent:** **Jan. 5, 2016**

(54) **DOCUMENT COLLABORATION EFFECTS**

(75) Inventors: **Wang Chiu Chan**, Hong Kong (HK);
Charles J. Migos, San Bruno, CA (US);
Keng Fai Lee, Cupertino, CA (US); **M.**
Frank Emanuel, San Mateo, CA (US)

(73) Assignee: **Apple Inc.**, Cupertino, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 58 days.

6,690,387 B2	2/2004	Zimmerman et al.	
7,015,894 B2	3/2006	Morohoshi	
7,184,064 B2	2/2007	Zimmerman et al.	
7,663,607 B2	2/2010	Hotelling et al.	
8,434,002 B1 *	4/2013	Shah et al.	715/255
8,479,122 B2	7/2013	Hotelling et al.	
2006/0026521 A1	2/2006	Hotelling et al.	
2006/0197753 A1	9/2006	Hotelling	
2006/0197764 A1 *	9/2006	Yang	345/473
2011/0055702 A1 *	3/2011	Jakobson	715/723
2012/0233543 A1 *	9/2012	Vagell et al.	715/255

(Continued)

FOREIGN PATENT DOCUMENTS

(21) Appl. No.: **13/332,315**

JP	2000-163031 A	6/2000
JP	2002-342033 A	11/2002

(22) Filed: **Dec. 20, 2011**

(65) **Prior Publication Data**

US 2013/0155071 A1 Jun. 20, 2013

(51) **Int. Cl.**
G06T 13/00 (2011.01)
G06T 19/00 (2011.01)

(52) **U.S. Cl.**
CPC **G06T 13/00** (2013.01); **G06T 19/00**
(2013.01); **G06T 2219/024** (2013.01)

(58) **Field of Classification Search**
CPC G06T 13/00; G06F 17/30; G06F 15/16;
G06F 17/24
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,483,261 A	1/1996	Yasutake
5,488,204 A	1/1996	Mead et al.
5,825,352 A	10/1998	Bisset et al.
5,835,079 A	11/1998	Shieh
5,880,411 A	3/1999	Gillespie et al.
6,188,391 B1	2/2001	Seely et al.
6,310,610 B1	10/2001	Beaton et al.
6,323,846 B1	11/2001	Westerman et al.

Lee, S.K. et al. (Apr. 1985). "A Multi-Touch Three Dimensional Touch-Sensitive Tablet," *Proceedings of CHI: ACM Conference on Human Factors in Computing Systems*, pp. 21-25.

(Continued)

Primary Examiner — Ming Hon

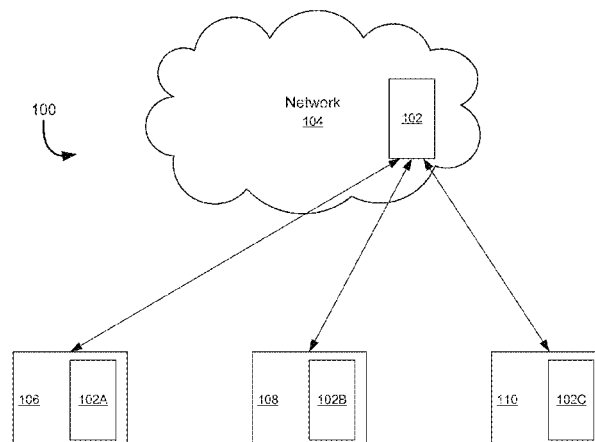
Assistant Examiner — Khoa Vu

(74) *Attorney, Agent, or Firm* — Morrison & Foerster LLP

(57) **ABSTRACT**

Various features and processes related to document collaboration are disclosed. In some implementations, animations are presented when updating a local document display to reflect changes made to the document at a remote device. In some implementations, a user can selectively highlight changes made by collaborators in a document. In some implementations, a user can select an identifier associated with another user to display a portion of a document that includes the other user's cursor location. In some implementations, text in document chat sessions can be automatically converted into hyperlinks which, when selected, cause a document editor to perform an operation.

36 Claims, 13 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

2013/0120401	A1 *	5/2013	Borysenko et al.	345/473
2013/0124952	A1 *	5/2013	Frem et al.	715/202
2013/0127734	A1 *	5/2013	Dowd et al.	345/173
2013/0218845	A1 *	8/2013	Kleppner et al.	707/687

OTHER PUBLICATIONS

Rubine, D.H. (Dec. 1991). "The Automatic Recognition of Gestures," CMU-CS-91-202, Submitted in Partial Fulfillment of the

Requirements of the Degree of Doctor of Philosophy in Computer Science at Carnegie Mellon University, 285 pages.
Rubine, D.H. (May 1992). "Combining Gestures and Direct Manipulation," CHI '92, pp. 659-660.
Westerman, W. (Spring 1999). "Hand Tracking, Finger Identification, and Chordic Manipulation on a Multi-Touch Surface," A Dissertation Submitted to the Faculty of the University of Delaware in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Electrical Engineering, 364 pages.

* cited by examiner

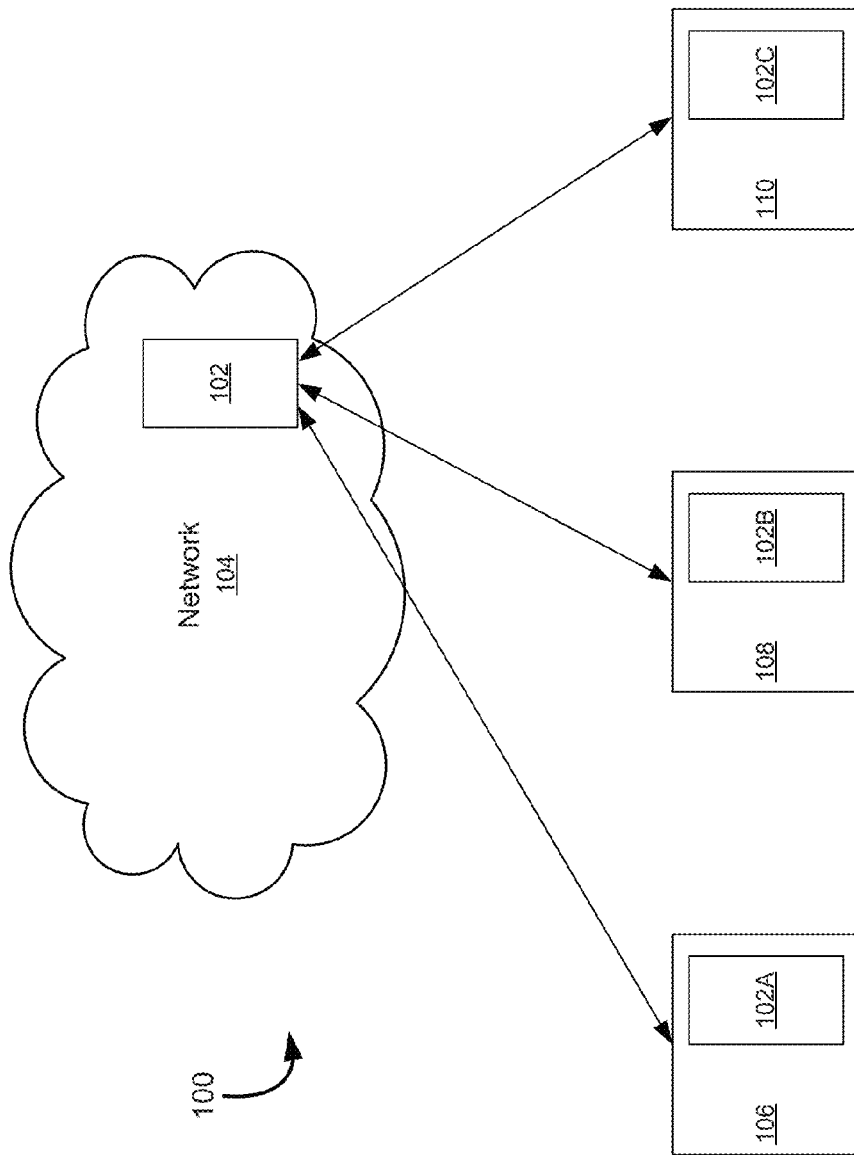
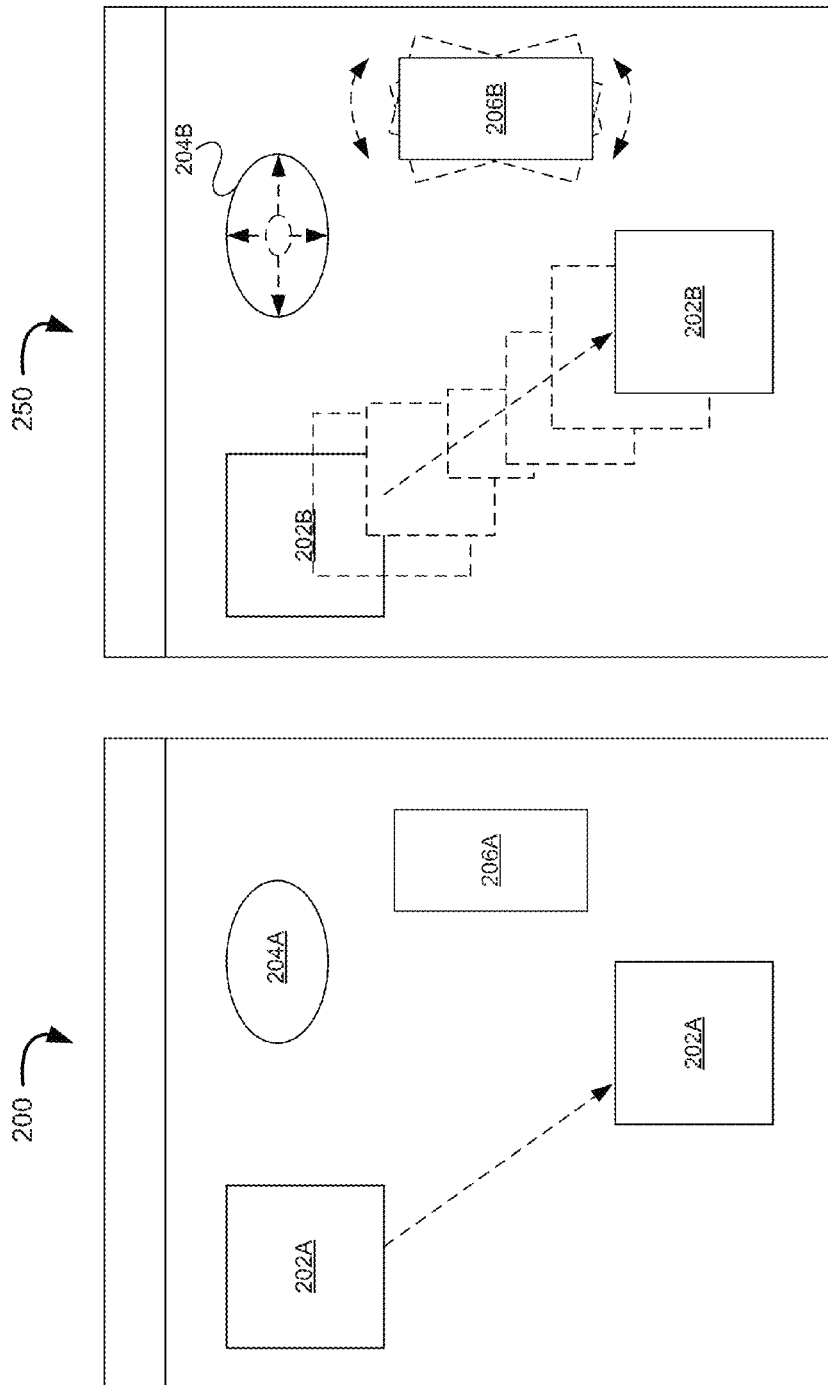


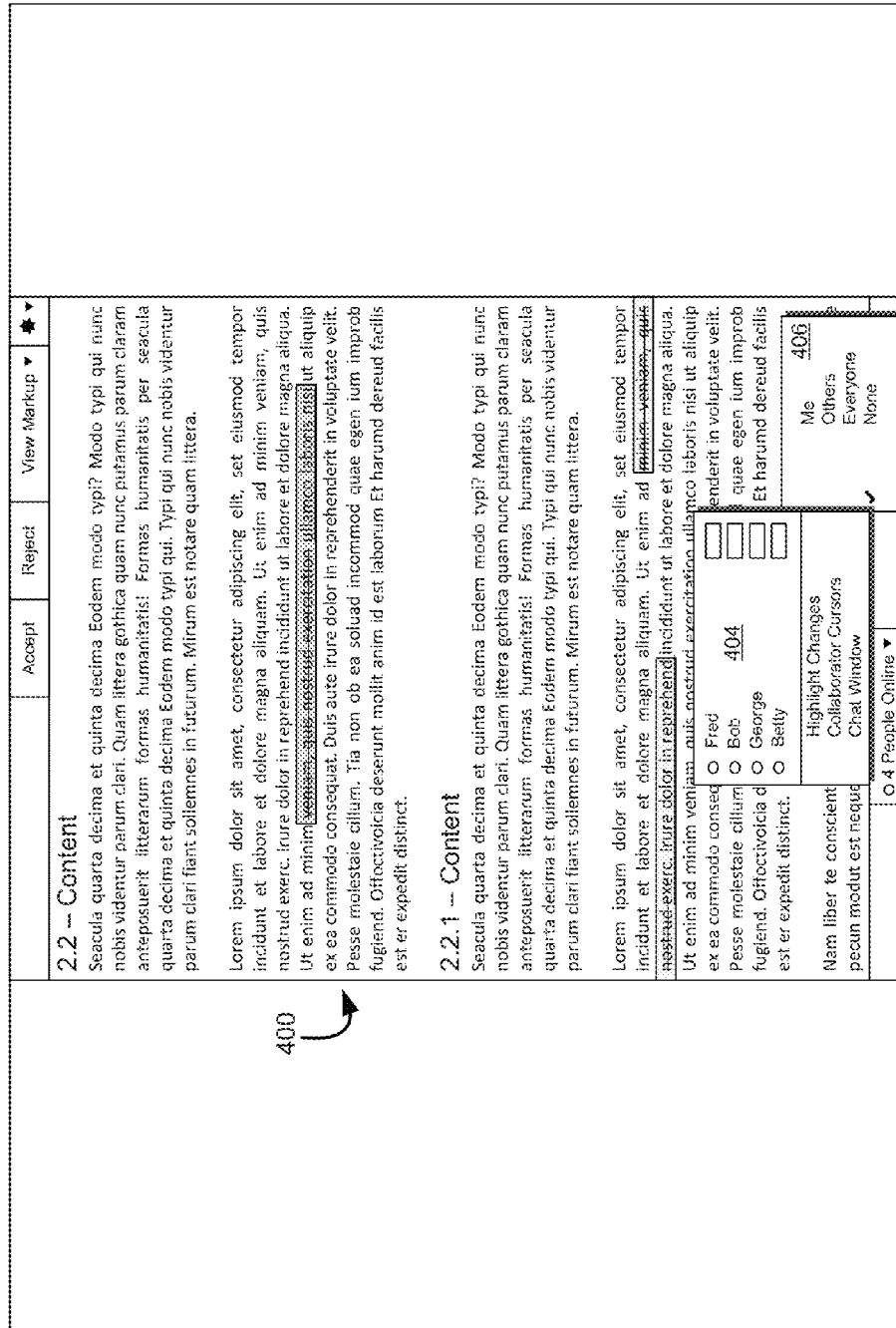
FIG. 1



261

		Accept	Reject	View Markup ▼	★ ▼
2.2 – Content					
Seacula quarta decima et quinta decima Eodem modo typi? Modo typi qui nunc nobis videntur parum clari. Quam littera gothica quam nunc putamus parum claram anteposuerit litterarum formas humanitatis! Formas humanitatis per seacula quarta decima et quinta decima Eodem modo typi qui. Typi qui nunc nobis videntur parum clari fiant sollemnes in futurum. Mirum est notare quam littera.					
300	Lorem ipsum dolor sit amet, consectetur adipiscing elit, set eiusmod tempor incididunt ut labore et dolore magna aliquam. Ut enim ad minim veniam, quis nostrud exerc. Irure dolor in reprehend incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit. Pesse molestaie cillum. Tia non ob ea soliad incommo quae egen ium improb fugiend. Offoctwoicia deserunt mollit anim id est laborum Et harum dereud facilis est er expedit distinct.				
2.2.1 – Content					
Seacula quarta decima et quinta decima Eodem modo typi? Modo typi qui nunc nobis videntur parum clari. Quam littera gothica quam nunc putamus parum claram anteposuerit litterarum formas humanitatis! Formas humanitatis per seacula quarta decima et quinta decima Eodem modo typi qui. Typi qui nunc nobis videntur parum clari fiant sollemnes in futurum. Mirum est notare quam littera.					
Lorem ipsum dolor sit amet, consectetur adipiscing elit, set eiusmod tempor incididunt ut labore et dolore magna aliquam. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit. Pesse molestaie cillum. Tia non ob ea soliad incommo quae egen ium improb fugiend. Offoctwoicia deserunt mollit anim id est laborum Et harum dereud facilis est er expedit distinct.					
Nam liber te conscient to factor tum poen legum odioque civiuda et tam. Neque pecun modut est neque honor et imper ned libidig met, consectetur adipiscing elit.					
					0 3 People Online ▼

FIG. 3



46

500

2.2 – Content

Seacula quarta decima et qu
nobis videntur parum clari. Quam littera gothica qua
anteponitur litterarum formas humanitatis! Fori
quarta decima et quinta decima Eodem modo typi q
parum clari fiant sollemnes in futurum. Mirum est no

502

504

506

Accept All Changes
Reject All Changes
Accept Selected Changes
Reject Selected Changes
Turn Off Tracking

Accept

Reject

View Markup

508

Lorem ipsum dolor sit amet, consectetur adipiscing elit, set eiusmod tempor
incididunt et labore et dolore magna aliquam. Ut enim ad minim veniam, quis
nostrud exerc. Irure dolor in reprehend incididunt ut labore et dolore magna aliqua.
Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip
ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit.
Pesse molestaie cillum. Tia non ob ea soliad Incommod quae egen ium improb
fugienti. Offoctivoicia deserunt mollit anim id est laborum Et harumid dereud facilis
est er expedit distinct.

2.2.1 – Content

Seacula quarta decima et quinta decima Eodem modo typi? Modo typi qui nunc
nobis videntur parum clari. Quam littera gothica quam nunc putamus parum claram
anteponitur litterarum formas humanitatis! Formas humanitatis per seacula
quarta decima et quinta decima Eodem modo typi qui. Typi qui nunc nobis videntur
parum clari fiant sollemnes in futurum. Mirum est notare quam littera.

Lorem ipsum dolor sit amet, consectetur adipiscing elit, set eiusmod tempor
incididunt et labore et dolore magna aliquam. Ut enim ad minim veniam, quis
nostrud exerc. Irure dolor in reprehenderit in voluptate velit, set eiusmod
Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip
ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit.
Pesse molestaie cillum. Tia non ob ea soliad Incommod quae egen ium improb
fugienti. Offoctivoicia deserunt mollit anim id est laborum Et harumid dereud facilis
est er expedit distinct.

Nam liber te conscient to factor tum poen legum odioque civiuda et tam. Neque
pecun modut est neque nonor et imper ned libidig met, consectetur adipiscing elit,

0 3 People Online

FIG. 5

	Accept	Reject	View Markup	★																								
<h2>2.2 -- Content</h2>																												
Seacula quarta decima et quinta decima Eodiem modo typi? Modo typi qui nunc nobis videtur parum clari. Quam littera gothica quam nunc putamus parum claram anteposuerit litterarum formas humanitatis! Formas humanitatis per seacula quarta decima et quinta decima Eodem modo typi qui. Typi qui nunc nobis videntur parum clari fiant sollemnes in futurum. Mirum est notare quam littera.																												
<p>Lorem ipsum dolor sit amet, consectetur adipiscing elit, set eiusmod tempor incididunt ut labore et dolore magna aliquam. Ut enim ad minim veniam, quis nostrud exerc. Irure dolor in reprehenderit in labor e dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit. Pesse molestaie cillum. Tia non ob ea soluat incommo d quae egen ium improbi fugiend. Offoctioicia deserunt mollit anim id est laborum Et harumid dereeud facilis est er expedit distinct.</p>																												
<h3>2.2.1 -- Content</h3>																												
Seacula quarta decima et quinta decima Eodiem modo typi? Modo typi qui nunc nobis videtur parum clari. Quam littera gothica quam nunc putamus parum claram anteposuerit litterarum formas humanitatis! Formas humanitatis per seacula quarta decima et quinta decima Eodem modo typi qui. Typi qui nunc nobis videntur parum clari fiant sollemnes in futurum. Mirum est notare quam littera.																												
<p>Lorem ipsum dolor sit amet, consectetur adipiscing elit, set eiusmod tempor incididunt ut labore et dolore magna aliquam. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit. Pesse molestaie cillum. Tia non ob ea soluat incommo d quae egen ium improbi fugiend. Offoctioicia deserunt mollit anim id est laborum Et harumid dereeud facilis est er expedit distinct.</p>																												
<table border="1"> <thead> <tr> <th>Nam liber te conscient pecun modut est neque</th> <th>Highlight Changes Collaborator Cursors Chat Window</th> <th> <input type="radio"/> Fred <input type="radio"/> Bob <input type="radio"/> George <input type="radio"/> Betty </th> </tr> </thead> <tbody> <tr> <td>neque ut autem vel eum iure unde accusantium delectatibus tempora cum</td> <td></td> <td></td> </tr> <tr> <td>etiam vero repellendus ratione ut qui</td> <td></td> <td></td> </tr> <tr> <td>voluptatem blanditiis praesentium delectatur sint</td> <td></td> <td></td> </tr> <tr> <td>consequatur eligendi cupiditate</td> <td></td> <td></td> </tr> <tr> <td>autem sunt officiis sit pariatur quidem veritas</td> <td></td> <td></td> </tr> <tr> <td>unde ipsa aperiam consequatur</td> <td></td> <td></td> </tr> <tr> <td>est et expedit distinct.</td> <td></td> <td></td> </tr> </tbody> </table>					Nam liber te conscient pecun modut est neque	Highlight Changes Collaborator Cursors Chat Window	<input type="radio"/> Fred <input type="radio"/> Bob <input type="radio"/> George <input type="radio"/> Betty	neque ut autem vel eum iure unde accusantium delectatibus tempora cum			etiam vero repellendus ratione ut qui			voluptatem blanditiis praesentium delectatur sint			consequatur eligendi cupiditate			autem sunt officiis sit pariatur quidem veritas			unde ipsa aperiam consequatur			est et expedit distinct.		
Nam liber te conscient pecun modut est neque	Highlight Changes Collaborator Cursors Chat Window	<input type="radio"/> Fred <input type="radio"/> Bob <input type="radio"/> George <input type="radio"/> Betty																										
neque ut autem vel eum iure unde accusantium delectatibus tempora cum																												
etiam vero repellendus ratione ut qui																												
voluptatem blanditiis praesentium delectatur sint																												
consequatur eligendi cupiditate																												
autem sunt officiis sit pariatur quidem veritas																												
unde ipsa aperiam consequatur																												
est et expedit distinct.																												
		<input type="radio"/> 4 People Online																										

66

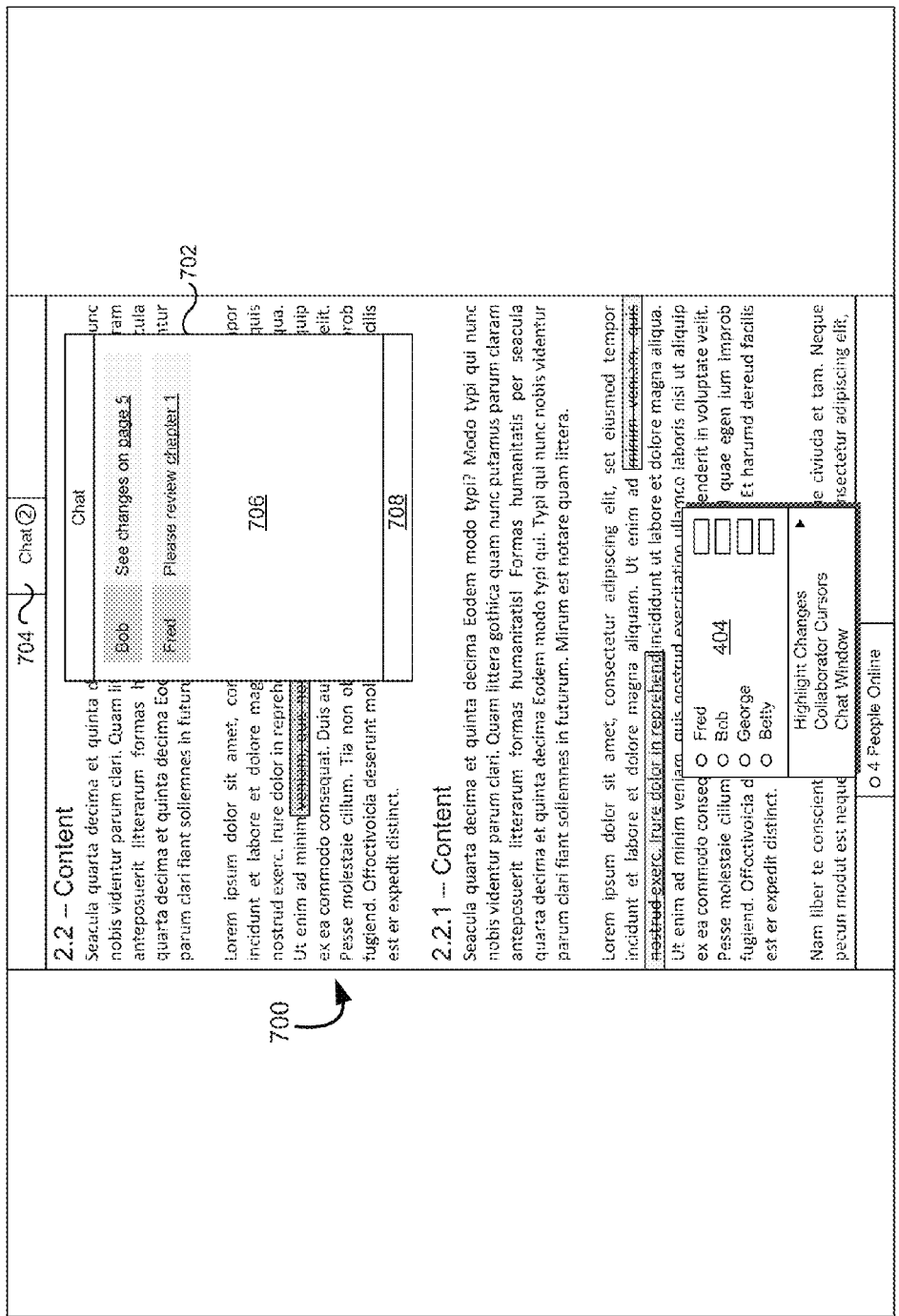


FIG. 7

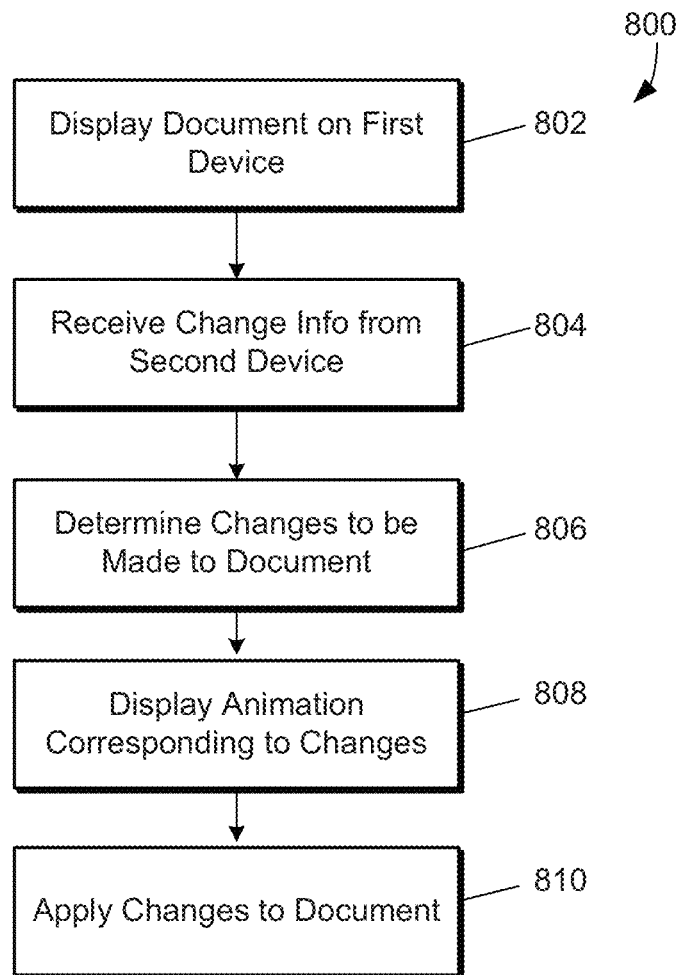


FIG. 8

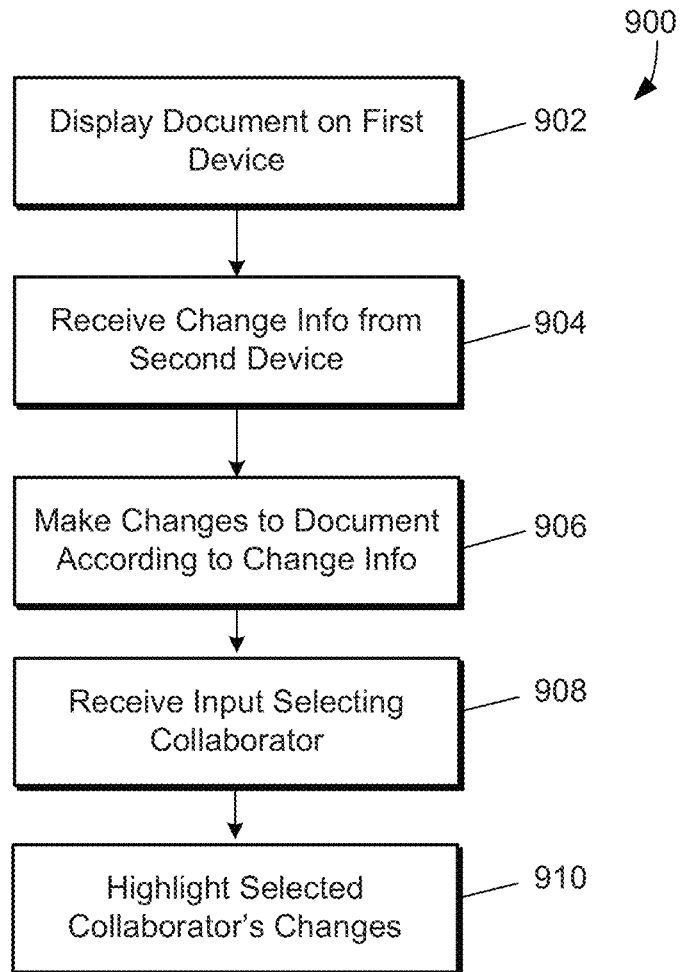


FIG. 9

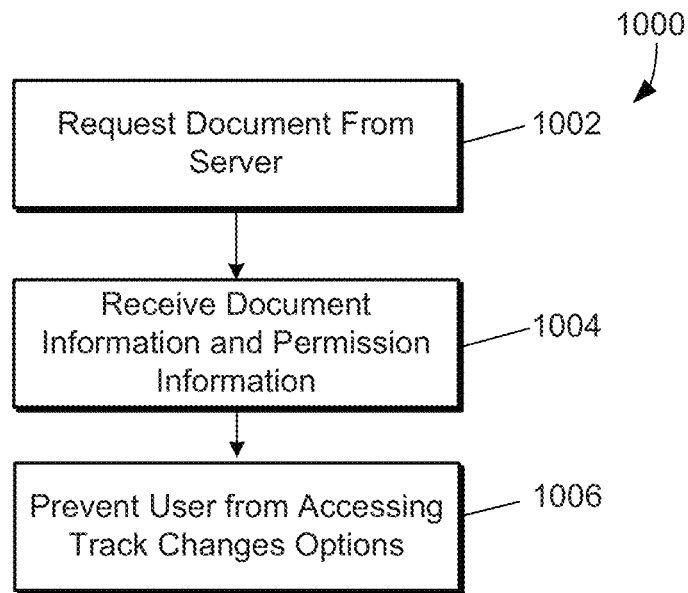


FIG. 10

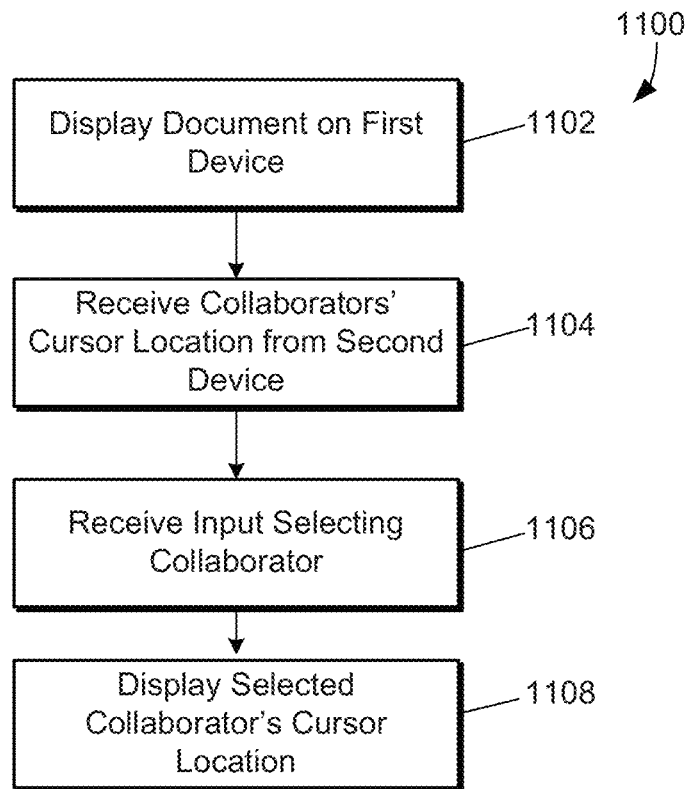


FIG. 11

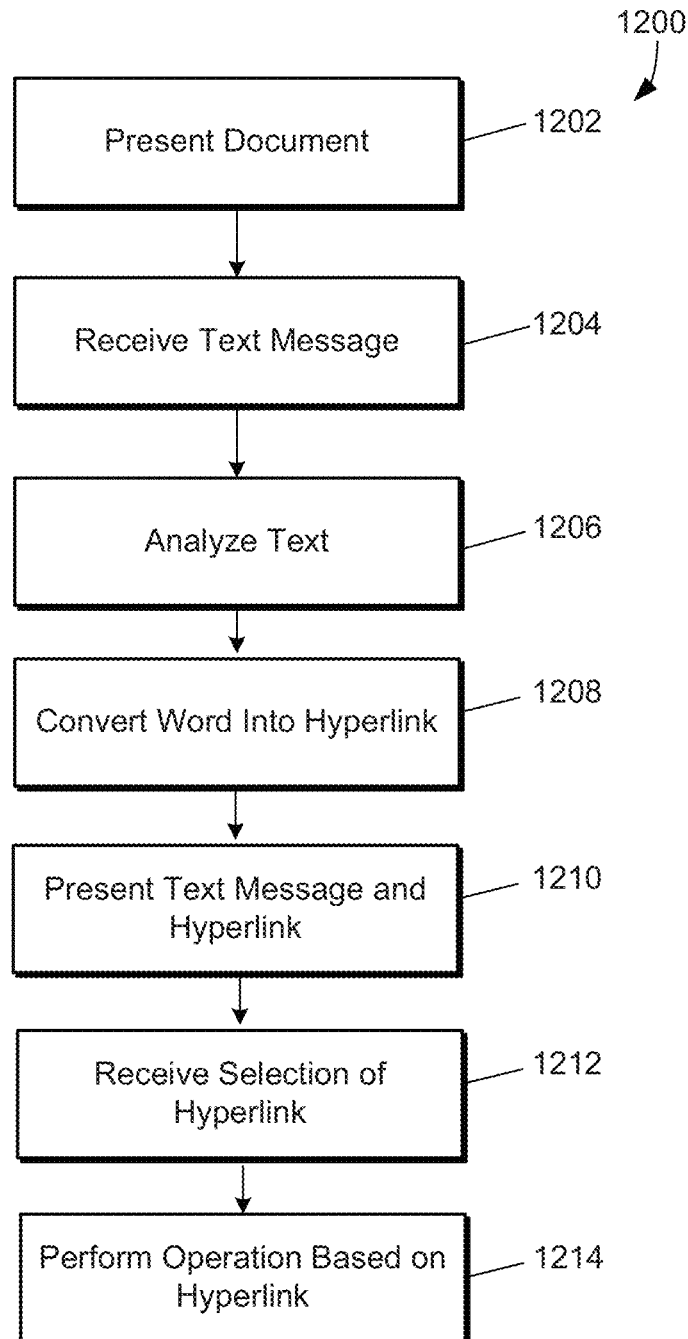


FIG. 12

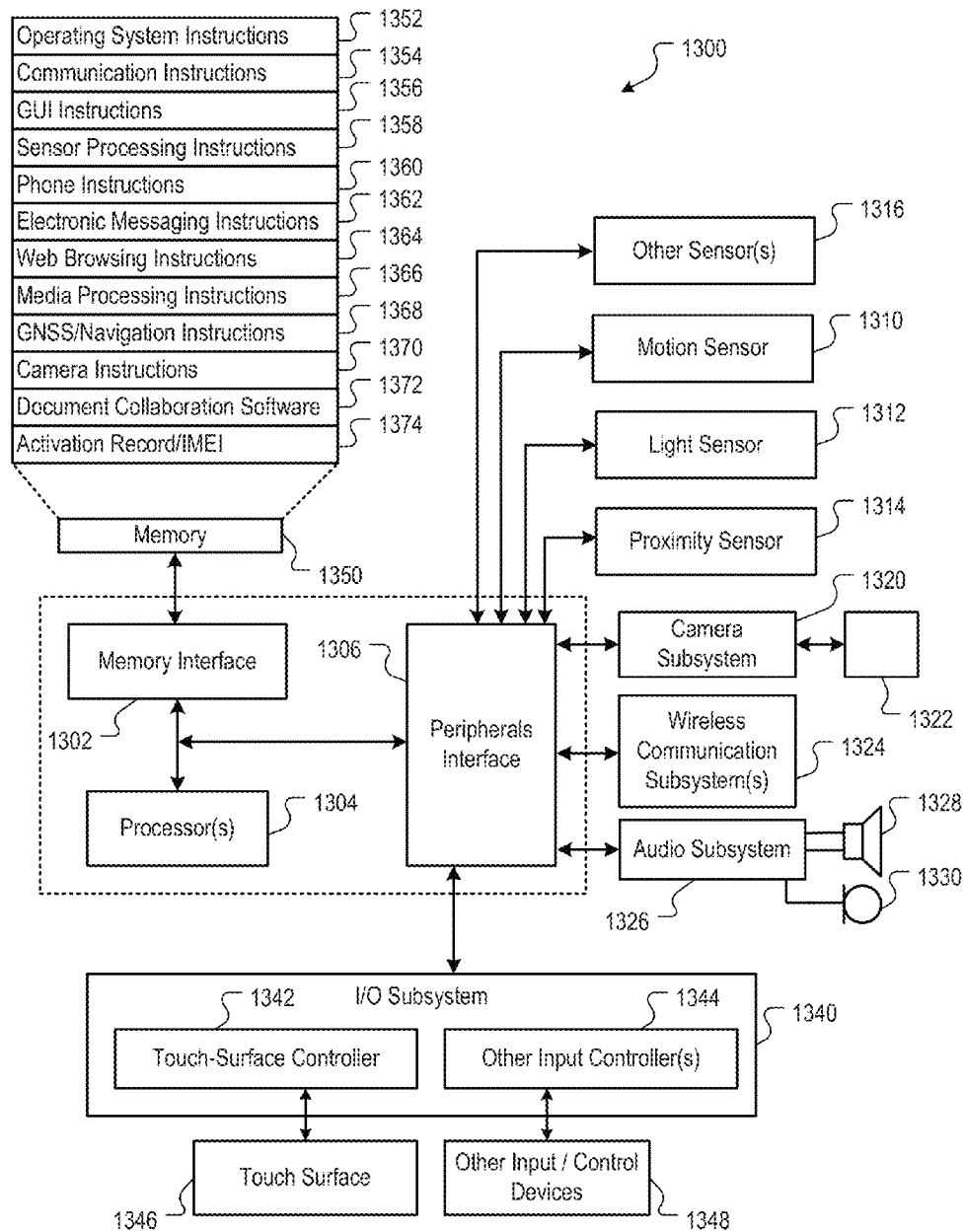


FIG. 13

1

DOCUMENT COLLABORATION EFFECTS**TECHNICAL FIELD**

The disclosure generally relates to document editing and collaboration.

BACKGROUND

Multi-user collaboration on documents is often necessary in industry, academics and other endeavors. For example, software developers may need to collaborate while writing a software architecture document. Students may need to collaborate on a presentation or academic paper. Collaboration on a document is often accomplished by editing the document sequentially (e.g., one collaborator can edit the document at a time). Alternatively, collaboration on a document can be accomplished by having each collaborator edit a different version of the document and then merging the documents together. These methods of collaborating on a document can often be cumbersome, time consuming and inefficient.

SUMMARY

Various features and processes related to document collaboration are disclosed. In some implementations, animations are presented when updating a local document display to reflect changes made to the document at a remote device. In some implementations, a user can selectively highlight changes made by collaborators in a document. In some implementations, a user can select an identifier associated with another user to display a portion of a document that includes the other user's cursor location. In some implementations, text in document chat sessions can be automatically converted into hyperlinks which, when selected, cause a document editor to perform an operation.

Particular implementations provide at least the following advantages: Animating changes to a document can quickly draw a user's attention to the changes and provide a more entertaining collaboration experience. Selectively highlighting document changes can allow a user to quickly find important changes to the document. Jumping to another user's cursor location allows users to quickly view the changes that other users are currently making to a document. Document chat links allow collaborating users to communicate and help each other in a more efficient manner.

Details of one or more implementations are set forth in the accompanying drawings and the description below. Other features, aspects, and potential advantages will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

FIG. 1 illustrates an example system for concurrent document collaboration.

FIG. 2 illustrates an example graphical user interface for presenting collaboration effects.

FIG. 3 illustrates an example graphical interface for presenting text changes made to a document.

FIG. 4 illustrates an example graphical interface for selective change highlighting.

FIG. 5 illustrates an example graphical interface for accepting or rejecting changes to a document.

FIG. 6 illustrates an example graphical interface for jumping to a collaborator's cursor location.

FIG. 7 illustrates an example graphical interface for presenting smart text in a document chat session.

2

FIG. 8 is a flow diagram of an example process for presenting collaboration effects.

FIG. 9 is a flow diagram of an example process for selective change highlighting.

FIG. 10 is a flow diagram of an example process for permissions based document change tracking.

FIG. 11 is a flow diagram of an example process for jumping to a collaborator's cursor location.

FIG. 12 is a flow diagram of an example process for smart text in document chat.

FIG. 13 is a block diagram of an example computing device for implementing the features and processes of FIGS. 1-12.

Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION**Document Collaboration**

FIG. 1 illustrates an example system 100 for concurrent document collaboration. In some implementations, two or more users can collaborate on a document simultaneously. For example, document 102 can be a word processing document, a spreadsheet document, a multi-media document, or any other document that can be edited. In some implementations, document 102 can be stored on a computing device within network 104. Network 104 can be a network that includes wired or wirelessly connected computing devices. For example, network 104 can include the Internet (e.g., World Wide Web), an intranet, or a home network. In some implementations, network 104 can be coupled to or include computing devices 106, 108 and/or 110. For example, computing devices 106, 108 and 110 can include any computing device, such as a laptop computer, desktop computer, tablet computer, smartphone, etc.

In some implementations, users of computing devices 106, 108 and 110 can collaborate on editing document 102. In some implementations, computing devices 106, 108 and 110 can provide access to document 102 such that users can make changes or edit document 102 concurrently. For example, computing devices 106, 108 and 110 can provide a view 102A, 102B, 102C of document 102. Document views 102A, 102B and 102C can be a local copy of document 102 that is automatically synchronized with document 102 in network 104. Document views 102A, 102B and 102C can be representations of the actual document 102 such that changes made within the document views are made near real-time to document 102. In some implementations, changes made to documents view 102A on computing device 106 can be synchronized with document 102 on network 104 and viewed within document views 102B and 102C on computing devices 108 and 110 as the changes are being made within document view 102A. For example, as a character, word, object or other content is added to document 102 through document view 102A, the added content can be synchronized to and viewed within document views 102B and 102C. Thus, the changes within document view 102A can be synchronized with document 102 and seen within document views 102B and 102C in approximately real-time.

Collaboration Effects

FIG. 2 illustrates an example graphical interface 250 for presenting collaboration effects. In some implementations, graphical interfaces 200 and 250 can correspond to an interface for viewing or editing document view 102A, 102B or 102C. In some implementations, an animation can be used for presenting changes made to a document. For example, when

a user makes changes to a document within document view 102A on computing device 106, the changes can be presented to a user of computing device 108 within document view 102B along with an animation associated with the change.

In some implementations, when an object within a document is moved on a first device, the move can be animated on a second device. For example, interface 200 can display document view 102A on computing device 106. Document view 102A can display an object 202A corresponding to an object within document 102. A user of computing device 106 can move object 202A to a new location within document view 102A. The new location of object 202A can be synchronized with document 102 and displayed in document view 102C (interface 250) of computing device 110. For example, the location of corresponding object 202B in document view 102C can change. In some implementations, the change of location of object 202B in document view 102C can be animated. For example, object 202B in document view 102C can be animated to move from the object's original location to the object's new location as specified by the user of computing device 106. In some implementations, the move animation can include resizing object 202B. For example, object 202B can be scaled up or scaled down in size during the move animation, as illustrated by FIG. 2.

In some implementations, when an object is added to, removed from, or resized on a document on a first device, the addition, removal or resizing of the object can be animated on a second device. For example, object 204A can be added to document view 102A (interface 200). The addition of object 204A within document view 102A can be synchronized to document 102 and can be displayed within document views 102B and 102C. For example, corresponding object 204B in can be added to document view 102C (interface 250). In some implementations, the addition of object 204B to document view 102C can be animated. For example, object 204B can be animated to expand out (e.g., grow) from a single point until object 204B is the size of the added object 204A. In some implementations, object 204B can be animated to bounce into view on document view 102C. In some implementations, a deletion of an object can be presented with an animation. For example, if object 204A is deleted within document view 102A, object 204B can be shrunk (e.g., scaled down) to a single point and removed from document view 102C. Similarly, if object 204A is resized, object 204B can be animated to shrink or grow correspondingly.

In some implementations, if a user changes an attribute of an object on a first device, the change can be presented along with an animation on a second device. For example, if a user changes the color of object 206A (e.g., from orange to blue), object 206B can be modified to reflect the color change (e.g., object 206B will turn blue). In some implementations, an animation will be presented while changing colors. For example, a transition animation (e.g., a shaking, rotation, oscillation animation) can be presented when object 206B is changed from orange to blue.

In some implementations, other document change animations can be presented. For example, when a user on a first device edits a worksheet cell of a spreadsheet application, a highlight animation can be displayed on a second device as the changes to the worksheet cell are displayed on the second device. For example, the worksheet cell displayed on the second device can temporarily fill with color (e.g., yellow) when the worksheet cell is edited on the first device to draw the user's attention to the edited cell.

The document change animations described above can serve not only to present an interesting collaborative environment for document editing but can also serve to draw a user's

attention to edits that are currently being made to the document by other users (collaborators).

Tracking Changes in Real-Time

FIG. 3 illustrates an example graphical interface 300 for presenting text changes made to a document. In some implementations, graphical interface 300 can correspond to an interface for viewing or editing document view 102A, 102B or 102C. For example, changes made to document 102 by a user of computing device 106 through document view 102A can be viewed by a user of computing device 108 in document view 102B. In some implementations, the changes made to document 102 can be tracked, associated with a user who made the changes and highlighted so that other users (collaborators) can view the changes.

In some implementations, changes to document 102 (e.g., through document views 102A, 102B and/or 102C) can be tracked. For example, a document editor software application can have a track changes feature. In some implementations, if the track changes feature is turned on, changes made to the document will be provisional pending acceptance of the changes into the document. In some implementations, provisional changes can be marked up or annotated. For example, text added to a document can be underlined. Text deleted from a document can be presented with a line through the text (e.g., strikethrough formatted), for example.

In some implementations, the provisional changes can be associated with metadata that identifies who (e.g., which user) made the changes. For example, if a user named Bob made changes 302, then the metadata associated with change 302 will include information that identifies Bob as the user who made change 302. If a user named Fred made changes 304, then the metadata associated with change 304 will include information that identifies Fred as the user who made change 304.

In some implementations, the provisional changes can be highlighted. For example, the provisional changes can be color highlighted according to who made the provisional changes. Bob, for example, can be associated with the color yellow and provisional changes made by Bob can be highlighted in yellow (e.g., have a yellow background). Likewise, Fred can be associated with the color green and provisional changes made by Fred can be highlighted in green, for example.

In some implementations, the provisional changes, including formatting, markup, annotating and/or highlighting, can be seen by collaborators (users) as the provisional changes are made. For example, while a user of computing device 106 is making provisional changes to document 102 through document view 102A, users of computing devices 108 and 110 can view the provisional changes through respective document views 102B and 102C. As each character, word, sentence or object is added, deleted or modified in document view 102A, the provisional changes can be displayed in document views 102B and 102C along with the appropriate markup, formatting, annotations and/or highlighting, as described above.

Selective Change Highlighting

FIG. 4 illustrates an example graphical interface 400 for selective change highlighting. In some implementations, graphical interface 400 can correspond to an interface for viewing or editing document view 102A, 102B or 102C. In some implementations, a user can select which provisional changes will be highlighted. For example, graphical interface 400 can include graphical element 402. Graphical element

5

402 can present information about the number of collaborators (e.g., users, editors) that are currently accessing the document. For example, if four users are currently viewing, editing or otherwise accessing the document (e.g., document **102**), graphical element **402** will display information that indicates that four users are accessing the document.

In some implementations, graphical element **402** is selectable. For example, a user can select graphical element **402** to cause graphical element **404** to display. For example, graphical element **404** can be a popup menu, a pull-down menu, or a dialog window. In some implementations, graphical element **404** can display information about the users who are currently accessing the document and/or users who have accessed the document in the past. For example, graphical element **404** can present a list (e.g., a collaborator list) of the names of the users, each user's online status and/or the highlighting color associated with each user. In some implementations, graphical element **404** can provide access to additional features of graphical interface **400**. For example, a user can select the "Highlight Changes" feature of graphical interface **400** to display graphical element **406**.

In some implementations, graphical element **406** can present selectable change highlighting options. For example, a user can select an option to have graphical interface **400** highlight only the changes made by the user so that the user can quickly find the user's own provisional changes in the document. A user can select an option to highlight only the changes made by others. For example, the user may be interested in quickly finding and viewing the provisional changes made by other collaborators. A user can select an option to remove all change highlighting from the document. A user can select an option to highlight all changes in the document. For example, a user can deselect a currently selected option such that none of the change highlighting options are selected to cause all provisional changes to be highlighted in the document.

In some implementations, selective change highlighting can be performed on non-provisional changes as well as provisional changes. For example, portions of text within a document can be associated with the user who added the text to the document regardless of whether the added text is provisional or non-provisional. A user can select one of the change highlighting options presented on graphical element **406** to have the text associated with the selected highlighting option (e.g., text associated with the user, text associated with other users, all text highlighted by user, or no text highlighting) highlighted. For example, if the user selects the option for highlighting all text, then all of the text within the document will be highlighted according to the colors associated with the users who added the respective portions text.

Track Changes Permissions

FIG. 5 illustrates an example graphical interface **500** for accepting or rejecting changes to a document. In some implementations, provisional changes to a document can be accepted into or rejected from the document. For example, when provisional changes are accepted into the document the provisional changes become non-provisional changes (e.g., permanent changes subject to later edits) to the document. In some implementations, provisional changes can be accepted into the document by selecting a provisional change (e.g., placing the cursor over or highlighting the text associated with the provisional change) and selecting graphical element **502** (e.g., accept button). Provisional changes can be rejected from the document by selecting a provisional change and selecting graphical element **504** (e.g., reject button). In some

6

implementations, provisional changes can be accepted or rejected through graphical element **506**. For example, graphical element **506** can be displayed in response to a user selecting graphical element **508**.

In some implementations, graphical element **506** can display change tracking options. For example, graphical element **506** can display selectable options to accept all changes, reject all changes, accept selected changes (similar to graphical element **502**), reject selected changes (similar to graphical element **504**) and an option to turn off change tracking. A user can select any of the options to cause the corresponding action to be performed. For example, if a user selects the 'accept all changes' option, all of the provisional changes to the document will be accepted into the document as non-provisional changes to the document. Likewise, if the user selects the 'reject all changes' option, all of the provisional changes will be rejected (e.g., removed) from the document.

In some implementations, only an authorized user of the document can accept provisional changes into the document. In some implementations, the document can be associated with track changes permissions. The track changes permissions can be document metadata that identifies which users can perform track changes operations. For example, the track changes permissions can identify which users can turn track changes on and off and which users can accept or reject changes to the document. When the track changes feature is turned on, any user can make provisional changes to the document. However, only an authorized user can accept and reject provisional changes or turn on or off the track changes feature. In some implementations, a user can be authorized to perform specific track changes operations. For example, permissions can be defined that allow a user to turn on the track changes feature but prevent the same user from turning off the track changes feature.

In some implementations, an authorized user can perform track changes operations (e.g., accepting changes, rejecting changes, turning on or off track changes) as other users are editing the document. For example, the authorized user can view provisional changes as the changes are being made to the document by users and accept the provisional changes when they appear.

In some implementations, only the owner of a document will be authorized (e.g., will have permissions) to perform track changes operations. For example, the document owner can be a project supervisor who has assigned various editing tasks to other users. The other users can edit the document as they perform their tasks, the edits can be synchronized in near real-time to the document and the other users, the edits can be tracked if track changes is turned on, and the tracked changes can be presented as provisional changes to the document along with the appropriate markups, highlighting, formatting and annotations, as described above. The document owner can accept and reject provisional changes to the document and turn on or off the track changes feature.

In some implementations, an unauthorized user (e.g., non-owner user) will be unable to accept or reject changes to a document or turn on or off the track changes feature. For example, graphical interface **500** can prevent the non-owner user from selecting graphical elements **502** and **504** and prevent the non-owner user from displaying graphical element **506** or selecting any of the options on graphical element **506**. Graphical elements **502**, **504**, **506** and/or **508** can be disabled (e.g., not selectable) on graphical interface **500**, for example.

Jump to Collaborator's Cursor

FIG. 6 illustrates an example graphical interface **600** for jumping to a collaborator's cursor location. In some imple-

mentations, a user can cause another user's cursor location to be displayed on graphical interface **600**. For example, a user can select another user's name (e.g., George) displayed on graphical element **404**. In response to the selection, the portion of the document that includes the selected user's (e.g., George's) current cursor location will be displayed. Thus, a user can quickly go to and view the location in the document where the other user is making edits.

Smart Text in Document Chat

FIG. 7 illustrates an example graphical interface **700** for presenting smart text in a document chat session. In some implementations, a document editor can include a chat feature. For example, collaborators (users) who are working on a document can send messages to each other through a chat feature of the document editor. In some implementations, a user can open chat window **702** by selecting graphical element **704** (e.g., chat button) or the 'chat window' option of graphical element **404**. For example, a user can select a user from the list of users displayed on graphical element **404** and then select the 'chat window' option to initiate a chat session with the selected user. If a user has received a chat message, graphical element **704** can display an indication of the number of chat messages received. The user can select graphical element **704** to view the received chat messages. In some implementations, chat window **702** can display automatically when a new chat message is received.

In some implementations, chat window area **706** can display received chat messages. In some implementations, chat window area **708** can be an input area for composing messages to send to other users. For example, a user can use a keyboard (e.g., virtual or physical) to type text into area **708** and press the 'enter' or 'return' key on the keyboard to cause the text message to be sent to another user.

In some implementations, chat messages can include text that relates to functions of the document editor and/or attributes of the document. For example, text received in a chat message can refer to a page number, paragraph, a chapter, or a section of a document. The text can refer to a figure, graph or other media item embedded in the document. The chat message text can refer to an operation, menu item or feature of the document editor. For example, a user can assist another user by identifying a particular editing menu in a chat session.

In some implementations, text references to document attributes and/or document editor features can be converted into selectable links (e.g., hyperlinks) that, when selected, cause some document editor function to be performed. For example, a textual page reference (e.g., 'page 5') can be converted into a link, which when selected, causes the document editor to display page five (5) of the document. The link causes a 'go to page' function to be performed by the document editor. A textual reference to a 'drawing tool' of the document editor can be converted to a link which, when selected, can cause a corresponding drawing tool to be displayed in the document editor. In some implementations, the link can be displayed with special formatting (e.g., underlining) or highlighting to let the user know that the text of the link is selectable, as illustrated by FIG. 7.

Example Processes

FIG. 8 is a flow diagram of an example process **800** for presenting collaboration effects. In some implementations,

when a document change made on a first device is displayed on a second device, an animation associated with the change is displayed.

At step **802**, a document is displayed on a first device. For example, a document can be displayed and edited by multiple different users on multiple different devices.

At step **804**, change information is received from a second device. For example, a user on one device can make edits (changes) to the document. Information describing the changes can be transmitted to the other devices that are displaying the document. The change information can include information that identifies objects that were changed in the document (e.g., media objects, text, etc.), the type of changes made (e.g., additions, deletions, moves, formatting, etc.) and locations where the changes were made to the document.

At step **806**, the changes to be made to the document are determined. For example, once the change information is received, changes to the local document can be determined based on the change information. For example, the object information, the change type information and the location information can be analyzed to determine what changes need to be made to the document. The change information can specify that an image object was added to the document on page ten (10), for example.

At step **808**, an animation is displayed according to the type of document change. For example, the local document editor can be configured with animation information. Animation information can specify what kind of animation to display for a particular document change. For example, the animation information can include a mapping of animation type to object type and/or change type. For example, an addition change type can be mapped to a scale up (e.g., enlarge, grow) animation. A move change type can be mapped to a move animation. A change to an image object can be mapped to a shake (e.g., wiggle) animation.

In some implementations, an animation can be determined based on the change information. For example, the object type and/or the change type in the change information can be used to lookup the appropriate animation. Once the animation is determined, the animation can be displayed at the document location specified in the change information. For example, the object to be added, deleted, modified or moved can be animated according to the change information and the animation information.

At step **810**, the changes can be applied to the document. For example, after or while the animation is displayed, the changes identified in the change information can be applied to the document. For example, the object can be added, deleted, modified, or moved within the document according to the change information.

FIG. 9 is a flow diagram of an example process **900** for selective change highlighting. In some implementations, a user can select which collaborators' changes to highlight.

At step **902**, a document is displayed on a first device. For example, multiple users can collaborate on a document from multiple devices.

At step **904**, change information is received from a second device. For example, each user can make changes to the document. Each user's changes can be transmitted to the other user's devices. Thus, a user's device can receive change information from one or more other users' devices. For example, the change information can include a description of the type of change, such as an identification and location of text that has been added or deleted from the document and an identification of a user corresponding to each change.

At step **906**, changes are made to the document according to the change information. For example, each user's changes

can be incorporated into the document displayed on the other users' devices. If track changes is turned on, each users' changes will be displayed as provisional changes (e.g., marked up and/or highlighted) until the provisional changes are accepted into the document.

At step **908**, input selecting one or more collaborators is received. For example, a user can select to highlight the user's own changes, other users' changes, all changes or no changes.

At step **910**, the selected collaborators' changes are highlighted. Once the user has selected whose changes to highlight, the document display can be modified to highlight the selected users' changes. For example, change highlighting can be performed by changing the background color of text from white to a color, such as green, yellow or red. In some implementations, only the selected users' changes will be highlighted.

FIG. **10** is flow diagram of an example process **1000** for permissions based document change tracking. In some implementations, provisional changes to a document can only be accepted by authorized users. In some implementations, an authorized user is an owner of the document. In some implementations, an authorized user is determined based on permissions associated with the document.

At step **1002**, a document is requested from a document server. For example, a user device can request a document from the server. The request can include identification information for the user. The document can be associated with multiple users and multiple devices. The users can collaborate on the document and make changes or edits to the document concurrently, for example.

At step **1004**, document information is received from the server along with document permissions information. For example, the document information can include content and formatting information for the document that defines how the document content should be displayed. The document permissions information can indicate whether the requesting user has permission to accept or reject provisional changes to the document. For example, when the server receives the document request, the server can determine whether the requesting user has permissions to accept or reject changes to the document and whether the requesting user can turn on and off the track changes feature. The server can look up the user's permissions based on the user identification information included in the document request.

At step **1006**, the user is prevented from accessing the track changes options. For example, if the document permissions information indicates that the requesting user is not authorized to accept or reject provisional changes to the document and/or is not authorized to turn on or off the track changes feature, the user will be prevented from invoking any of these track changes options. For example, the graphical interface elements for accepting and rejecting changes and turning on and off the track changes features can be disabled so that the user cannot select these elements.

FIG. **11** is a flow diagram of an example process for jumping to a collaborator's cursor location. At step **1102**, a document can be displayed to a user on a first device. For example, multiple users on multiple devices can collaborate on editing a document.

At step **1104**, the first device can receive information describing another user's cursor location in the document. For example, each user's device can communicate information to other devices. For example, a user's device can communicate to other users' devices information describing changes made to the document and current cursor location information. The information can be communicated directly

from device to device or can be transmitted to and forwarded from the server that manages (stores) the document.

At step **1106**, input selecting the other user can be received. For example, graphical interface **600** can display a list of user's who are currently accessing the document and a user can select one of the users in the list, as described above with reference to FIG. **6**.

At step **1108**, the selected user's cursor location can be displayed. For example, a portion of the document that includes the location of the selected user's cursor can be displayed. If the user's cursor is located on page six, then page six can be displayed, for example.

FIG. **12** is a flow diagram of an example process **1200** for smart text in document chat. At step **1202**, a document is presented in a graphical interface of a device. For example, the document can be presented in a user interface of a document editing application.

At step **1204**, a text message is received. For example, the document editing application can include a chat feature that allows user to communicate while collaborating on the document and a user can receive a text chat message while viewing the document.

At step **1206**, the text of the chat message is analyzed for keywords. For example, the document editing application and/or the chat feature can be configured to recognize keywords related to document attributes and/or document editing application features and functions. Document attribute keywords can include 'page,' 'chapter,' and 'figure,' among others. Document editing application keywords can include 'insert,' 'open,' and 'format,' among others. Each of these keywords can correspond to a document editor function. For example, the keyword 'page' can correspond to a 'go to page' function. The keyword 'insert' can correspond to an insert menu item.

At step **1208**, the words matching configured keywords are converted into hyperlinks. For example, when a chat message is received containing the text "See page 5," the word 'page' will be recognized as a keyword and the word and the page number '5' will be converted into a hyperlink. The hyperlink will be configured to invoke an operation corresponding to the recognized keyword. For example, the hyperlink can invoke a 'go to page' function, invoke a menu item, or invoke a tool of the document editor.

At step **1210**, the text message and the hyperlink will be displayed. For example, the chat message text will be displayed in a chat window. The portion of the chat message text that includes 'page 5' will be displayed as a hyperlink. At step **1212**, a selection of the hyperlink is received. For example, a user can select the 'page 5' hyperlink in the chat window.

At step **1214**, the document editing application can perform an operation based on the hyperlink. For example, when the 'page 5' hyperlink is selected, the document editing application can display page 5 of the document. Other operations, such as invoking an editing tool or menu item, can be invoked based on the configuration of the hyperlink.

Example Device Architecture

FIG. **13** is a block diagram **1300** of an example computing device (e.g., computing device **102**, **106**, **108** and/or **110** of FIG. **1**) for implementing the features and processes of FIGS. **1-12**. The device can include a memory interface **1302**, one or more data processors, image processors and/or central processing units **1304**, and a peripherals interface **1306**. The memory interface **1302**, the one or more processors **1304** and/or the peripherals interface **1306** can be separate components or can be integrated in one or more integrated circuits.

11

The various components in the device can be coupled by one or more communication buses or signal lines.

Sensors, devices, and subsystems can be coupled to the peripherals interface **1306** to facilitate multiple functionalities. For example, a motion sensor **1310**, a light sensor **1312**, and a proximity sensor **1314** can be coupled to the peripherals interface **1306** to facilitate orientation, lighting, and proximity functions. Other sensors **1316** can also be connected to the peripherals interface **1306**, such as a global navigation satellite system (GNSS) (e.g., GPS receiver), a temperature sensor, a biometric sensor, or other sensing device, to facilitate related functionalities.

A camera subsystem **1320** and an optical sensor **1322**, e.g., a charged coupled device (CCD) or a complementary metal-oxide semiconductor (CMOS) optical sensor, can be utilized to facilitate camera functions, such as recording photographs and video clips. The camera subsystem **1320** and the optical sensor **1322** can be used to collect images of a user to be used during authentication of a user, e.g., by performing facial recognition analysis.

Communication functions can be facilitated through one or more wireless communication subsystems **1324**, which can include radio frequency receivers and transmitters and/or optical (e.g., infrared) receivers and transmitters. The specific design and implementation of the communication subsystem **1324** can depend on the communication network(s) over which the device is intended to operate. For example, the device can include communication subsystems **1324** designed to operate over a GSM network, a GPRS network, an EDGE network, a Wi-Fi or WiMax network, and a Bluetooth™ network. In particular, the wireless communication subsystems **1324** can include hosting protocols such that the device can be configured as a base station for other wireless devices.

An audio subsystem **1326** can be coupled to a speaker **1328** and a microphone **1330** to facilitate voice-enabled functions, such as speaker recognition, voice replication, digital recording, and telephony functions.

The I/O subsystem **1340** can include a touch-surface controller **1342** and/or other input controller(s) **1344**. The touch-surface controller **1342** can be coupled to a touch surface **1346**. The touch surface **1346** and touch-surface controller **1342** can, for example, detect contact and movement or break thereof using any of a plurality of touch sensitivity technologies, including but not limited to capacitive, resistive, infrared, and surface acoustic wave technologies, as well as other proximity sensor arrays or other elements for determining one or more points of contact with the touch surface **1346**.

The other input controller(s) **1344** can be coupled to other input/control devices **1348**, such as one or more buttons, rocker switches, thumb-wheel, infrared port, USB port, and/or a pointer device such as a stylus. The one or more buttons (not shown) can include an up/down button for volume control of the speaker **1328** and/or the microphone **1330**.

In one implementation, a pressing of the button for a first duration can disengage a lock of the touch surface **1346**; and a pressing of the button for a second duration that is longer than the first duration can turn power to the device on or off. Pressing the button for a third duration can activate a voice control, or voice command, module that enables the user to speak commands into the microphone **1330** to cause the device to execute the spoken command. The user can customize a functionality of one or more of the buttons. The touch surface **1346** can, for example, also be used to implement virtual or soft buttons and/or a keyboard.

In some implementations, the device can present recorded audio and/or video files, such as MP3, AAC, and MPEG files.

12

In some implementations, the mobile device **100** can include the functionality of an MP3 player, such as an iPod™. The device can, therefore, include a 36-pin connector that is compatible with the iPod. Other input/output and control devices can also be used.

The memory interface **1302** can be coupled to memory **1350**. The memory **1350** can include high-speed random access memory and/or non-volatile memory, such as one or more magnetic disk storage devices, one or more optical storage devices, and/or flash memory (e.g., NAND, NOR). The memory **1350** can store an operating system **1352**, such as Darwin, RTXC, LINUX, UNIX, OS X, WINDOWS, or an embedded operating system such as VxWorks.

The operating system **1352** can include instructions for handling basic system services and for performing hardware dependent tasks. In some implementations, the operating system **1352** can be a kernel (e.g., UNIX kernel). In some implementations, the operating system **1352** can include instructions for performing voice authentication. For example, operating system **1352** can implement the document collaboration features described with reference to FIGS. 1-12.

The memory **1350** can also store communication instructions **1354** to facilitate communicating with one or more additional devices, one or more computers and/or one or more servers. The memory **1350** can include graphical user interface instructions **1356** to facilitate graphic user interface processing; sensor processing instructions **1358** to facilitate sensor-related processing and functions; phone instructions **1360** to facilitate phone-related processes and functions; electronic messaging instructions **1362** to facilitate electronic-messaging related processes and functions; web browsing instructions **1364** to facilitate web browsing-related processes and functions; media processing instructions **1366** to facilitate media processing-related processes and functions; GNSS/Navigation instructions **1368** to facilitate GNSS and navigation-related processes and instructions; and/or camera instructions **1370** to facilitate camera-related processes and functions.

The memory **1350** can store other software instructions **1372** to facilitate other processes and functions, such as the document collaboration processes and functions described with reference to FIGS. 1-12. For example, the software instructions can include instructions for performing voice authentication on a per application or per feature basis and for allowing a user to configure authentication requirements of each application or feature available on device **100**.

The memory **1350** can also store other software instructions (not shown), such as web video instructions to facilitate web video-related processes and functions; and/or web shopping instructions to facilitate web shopping-related processes and functions. In some implementations, the media processing instructions **1366** are divided into audio processing instructions and video processing instructions to facilitate audio processing-related processes and functions and video processing-related processes and functions, respectively. An activation record and International Mobile Equipment Identity (IMEI) **1374** or similar hardware identifier can also be stored in memory **1350**.

Each of the above identified instructions and applications can correspond to a set of instructions for performing one or more functions described above. These instructions need not be implemented as separate software programs, procedures, or modules. The memory **1350** can include additional instructions or fewer instructions. Furthermore, various functions of the device can be implemented in hardware and/or in software, including in one or more signal processing and/or application specific integrated circuits.

13

What is claimed is:

1. A method comprising:

presenting a document in a graphical user interface of a document editing application on a display of a first device to a first user;

receiving, at the first device, information describing a first modification to the document at the first device by the first user;

in response to receiving information describing the first modification to the document at the first device by the first user, the presentation of the document on the first device to reflect the first modification to the document at the first device by the first user without presenting an animation associated with the first modification made to the document at the first device by the first user;

receiving, at the first device, information describing a second modification to the document at a second device by a second user;

in response to receiving information describing the second modification to the document at the second device by the second user, changing the presentation of the document on the first device to reflect the second modification to the document at the second device by the second user and presenting an animation associated with the second modification to the document;

receiving a message at the first device;

identifying one or more keywords in text of the message, the one or more keywords associated with at least one of an attribute of the document and a feature or function of the document editing application; and

presenting, on the first device, the message, wherein a portion of the text of the message associated with the identified one or more keywords is displayed as a selectable link, wherein the message is presented in a chat window displayed automatically when a new message is received or displayed in response to receiving input at an affordance.

2. The method of claim 1, wherein the second modification is associated with a graphical element of the document.

3. The method of claim 2, further comprising:

animating the graphical element on the display of the first device.

4. The method of claim 3, further comprising

determining a style of animation to present based on a type of the second modification; and

presenting the animation having the determined style.

5. The method of claim 4, wherein the modification type is at least one of an addition, a move, a style change and a deletion.

6. The method of claim 4, wherein the animation style is at least one of a shake animation, an expansion animation, and a shrinking animation.

7. A non-transitory computer-readable medium including one or more sequences of instructions which, when executed by one or more processors, causes:

presenting a document in a graphical user interface of a document editing application on a display of a first device to a first user;

receiving, at the first device, information describing a first modification to the document at the first device by the first user;

in response to receiving information describing the first modification to the document at the first device by the first user, changing the presentation of the document on the first device to reflect the first modification to the document at the first device by the first user without

14

presenting an animation associated with the first modification made to the document at the first device by the first user;

receiving, at the first device, information describing a second modification to the document at a second device by a second user;

in response to receiving information describing the second modification to the document at the second device by the second user, changing the presentation of the document on the first device to reflect the second modification to the document at the second device by the second user and presenting an animation associated with the second modification to the document

receiving a message at the first device;

identifying one or more keywords in text of the message, the one or more keywords associated with at least one of an attribute of the document and a feature or function of the document editing application; and

presenting, on the first device, the message, wherein a portion of the text of the message associated with the identified one or more keywords is displayed as a selectable link, wherein the message is presented in a chat window displayed automatically when a new message is received or displayed in response to receiving input at an affordance.

8. The non-transitory computer-readable medium of claim 7, wherein the second modification is associated with a graphical element of the document.

9. The non-transitory computer-readable medium of claim 8, further comprising:

animating the graphical element on the display of the first device.

10. The non-transitory computer-readable medium of claim 9, further comprising

determining a style of animation to present based on a type of the second modification; and

presenting the animation having the determined style.

11. The non-transitory computer-readable medium of claim 10, wherein the modification type is at least one of an addition, a move, a style change, and a deletion.

12. The non-transitory computer-readable medium of claim 10, wherein the animation style is at least one of a shake animation, an expansion animation, and a shrinking animation.

13. The method of claim 1, further comprising:

receiving a selection of the portion of the text of the message displayed as the selectable link; and

in response to receiving the selection, performing an operation associated with the selectable link.

14. The method of claim 1, wherein the attribute of the document includes at least one of a page number, a paragraph, a chapter, and a section of the document.

15. The method of claim 1, wherein the attribute of the document includes a media item embedded in the document.

16. The method of claim 1, wherein the feature or function of the document editing application includes one or more of an operation and a menu item.

17. The method of claim 1, wherein the affordance includes a display of a number, the number associated with a number of received chat messages.

18. The method of claim 1, wherein the portion of the text of the message includes the one or more keywords and additional words associated with the keywords.

19. The non-transitory computer-readable medium of claim 7, further comprising:

receiving a selection of the portion of the text of the message displayed as the selectable link; and

15

in response to receiving the selection, performing an operation associated with the selectable link.

20. The non-transitory computer-readable medium of claim 7, wherein the attribute of the document includes at least one of a page number, a paragraph, a chapter, and a section of the document. 5

21. The non-transitory computer-readable medium of claim 7, wherein the attribute of the document includes a media item embedded in the document.

22. The non-transitory computer-readable medium of claim 7, wherein the feature or function of the document editing application includes one or more of an operation and a menu item. 10

23. The non-transitory computer-readable medium of claim 7, wherein the affordance includes a display of a number, the number associated with of a number of received chat messages. 15

24. The non-transitory computer-readable medium of claim 7, wherein the portion of the text of the message includes the one or more keywords and additional words associated with the keywords. 20

25. A system comprising:

one or more processors; and

a non-transitory computer-readable medium including instructions which, when executed by the one or more processors, cause: 25

presenting a document in a graphical user interface of a document editing application on a display of a first device to a first user;

receiving, at the first device, information describing a first modification to the document at the first device by the first user; 30

in response to receiving information describing the first modification to the document at the first device by the first user, changing the presentation of the document on the first device to reflect the first modification to the document at the first device by the first user without presenting an animation associated with the first modification made to the document at the first device by the first user; 35

receiving, at the first device, information describing a second modification to the document at a second device by a second user; 40

in response to receiving information describing the second modification to the document at the second device by the second user, changing the presentation of the document on the first device to reflect the second modification to the document at the second device by the second user and presenting an animation associated with the second modification to the document; 45

16

receiving a message at the first device;

identifying one or more keywords in text of the message, the one or more keywords associated with at least one of an attribute of the document and a feature or function of the document editing application; and

presenting, on the first device, the message, wherein a portion of the text of the message associated with the identified one or more keywords is displayed as a selectable link, wherein the message is presented in a chat window displayed automatically when a new message is received or displayed in response to receiving input at an affordance.

26. The system of claim 25, wherein the second modification is associated with a graphical element of the document.

27. The system of claim 26, wherein the instructions further cause:

animating the graphical element on the display of the first device.

28. The system of claim 27, wherein the instructions further cause:

determining a style of animation to present based on a type of the second modification; and
presenting the animation having the determined style.

29. The system of claim 28, wherein the modification type is at least one of an addition, a move, a style change, and a deletion.

30. The system of claim 28, wherein the animation style is at least one of a shake animation, an expansion animation, and a shrinking animation.

31. The system of claim 25, wherein the instructions further cause:

receiving a selection of the portion of the text of the message displayed as the selectable link; and
in response to receiving the selection, performing an operation associated with the selectable link.

32. The system of claim 25, wherein the attribute of the document includes at least one of a page number, a paragraph, a chapter, and a section of the document.

33. The system of claim 25, wherein the attribute of the document includes a media item embedded in the document.

34. The system of claim 25, wherein the feature or function of the document editing application includes one or more of an operation and a menu item.

35. The system of claim 25, wherein the affordance includes a display of a number, the number associated with of a number of received chat messages.

36. The system of claim 25, wherein the portion of the text of the message includes the one or more keywords and additional words associated with the keywords.

* * * * *